

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

3273-0142P

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

09/869425

INTERNATIONAL APPLICATION NO.

PCT/JP00/07407

INTERNATIONAL FILING DATE

October 24, 2000

PRIORITY DATE CLAIMED

October 28, 1999

TITLE OF INVENTION

RESIN COMPOSITION HAVING IMPROVED IMPACT RESISTANCE AT LOW TEMPERATURES

APPLICANT(S) FOR DO/EO/US

ARITA, Hiroaki

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39 (1).
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
- a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
- b. ☒ has been transmitted by the International Bureau. WO 01/30914
- c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
- a. ☒ is transmitted herewith.
- b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4)
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
- a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
- b. ☐ have been transmitted by the International Bureau.
- c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
- d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 20. below concern document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98-International Search Report (PCT/ISA/210) in JP w/ 7 documents
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
14. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821-1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information:
- 1.) Zero (0) sheets of Formal Drawings

U.S. APPLICATION NO (if known, see 37 CFR 1.5) 09/869425		INTERNATIONAL APPLICATION NO PCT/JP00/07407		ATTORNEY'S DOCKET NUMBER 3273-0142P	
--	--	--	--	--	--

21. <input checked="" type="checkbox"/> The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO. \$1,000.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$860.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO. \$710.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$690.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00 ENTER APPROPRIATE BASIC FEE AMOUNT =	CALCULATIONS PTO USE ONLY <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%; text-align: right;">\$</td> <td style="width:50%; text-align: right;">860.00</td> <td style="width:40%;"></td> </tr> <tr> <td style="text-align: right;">\$</td> <td style="text-align: right;">0</td> <td></td> </tr> </table>		\$	860.00		\$	0	
\$	860.00							
\$	0							

Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	0	
---	--	--	--	----	---	--

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE			
Total Claims	10 - 20 =	0	X \$18.00	\$	0	
Independent Claims	1 - 3 =	0	X \$80.00	\$	0	
MULTIPLE DEPENDENT CLAIM(S) (if applicable) Yes			+ \$270.00	\$	270.00	
TOTAL OF ABOVE CALCULATIONS =				\$	1130.00	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				\$	0	
SUBTOTAL =				\$	1130.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	0	
TOTAL NATIONAL FEE =				\$	1130.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +				\$	40.00	
TOTAL FEES ENCLOSED =				\$	1170.00	
				Amount to be:	\$	
				refunded	\$	
				charged	\$	

a. ☒ A check in the amount of \$ **1170.00** to cover the above fees is enclosed.

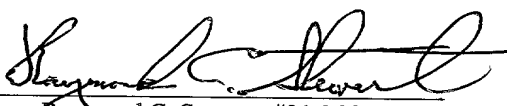
b. ☐ Please charge my Deposit Account. No. _____ in the amount of \$ _____ to cover the above fees.
A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 02-2448.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

Send all correspondence to:
Birch, Stewart, Kolasch & Birch, LLP or Customer No. 2292
P.O. Box 747
Falls Church, VA 22040-0747
(703)205-8000

Date: June 27, 2001

By 
 Raymond C. Stewart, #21,066

09/869425

JCO3 Rec'd PCT/FTC 27 JUN 2001

PATENT
3273-0142P

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant: ARITA, Hiroaki Conf.:
Int'l. Appl. No.: PCT/JP00/07407
Appl. No.: New Group:
Filed: June 27, 2001 Examiner:
For: RESIN COMPOSITION HAVING IMPROVED
IMPACT RESISTANCE AT LOW
TEMPERATURES

PRELIMINARY AMENDMENT

BOX PATENT APPLICATION

Assistant Commissioner for Patents
Washington, DC 20231

June 27, 2001

Sir:

The following Preliminary Amendments and Remarks are respectfully submitted in connection with the above-identified application.

AMENDMENTS

IN THE SPECIFICATION:

Please amend the specification as follows:

Before line 1, insert --This application is the national phase under 35 U.S.C. § 371 of PCT International Application No. PCT/JP00/07407 which has an International filing date of October 24, 2000, which designated the United States of America and was not published in English.

REMARKS

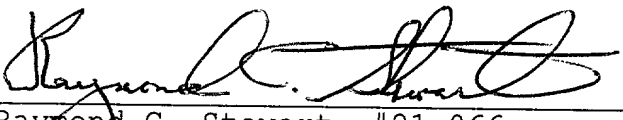
The specification has been amended to provide a cross-reference to the previously filed International Application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By


Raymond C. Stewart, #21,066

RCS/cqc
3273-0142P

P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

(Rev. 02/12/01)

DESCRIPTION

RESIN COMPOSITION HAVING IMPROVED IMPACT RESISTANCE AT LOW
TEMPERATURES

5

Technical Field

The present invention relates to resin compositions, and
specifically, it relates to resin compositions which are
useful for obtaining various molded articles that require
10 impact resistance at low temperatures, and to molded articles
composed of the resin compositions.

Background Art

Known methods for increasing impact resistance at low
15 temperatures of molded articles each composed of a
thermoplastic resin include a method in which various
elastomers (rubber components) are blended with the
thermoplastic resin, a method in which a plasticizer is added
to the thermoplastic resin, a method in which the
20 aforementioned two methods are combined, and a method in which
a thermoplastic elastomer is used.

However, even if any of these improvements is performed,
the resulting molded articles have insufficient impact
strength at low temperatures in some applications. As a
25 solution to this problem, one skilled in the art uses large

amounts of various elastomers or adds a plasticizer to the resin to the limit of compatibility with the resin. However, the use of large amounts of elastomers invites deteriorated characteristics of the resin, such as strengths (e.g., tensile strength and flexural strength), heat resistance and chemical resistance. The addition of large amounts of plasticizers causes bleeding of the plasticizers.

Disclosure of Invention

Accordingly, an object of the present invention is to provide a resin composition which can have substantially improved impact resistance at low temperatures, while maintaining its tensile properties, flexural properties and heat resistance properties, and to provide a molded article composed of the resin composition.

After intensive investigations to achieve the above objects, the present inventors have found that the incorporation of a glycol or its derivative into a thermoplastic elastomer can substantially improve impact resistance of the resulting molded article at low temperatures, without deterioration of the characteristics of the thermoplastic elastomer (e.g., tensile properties, flexural properties and heat resistance properties). The present invention has been accomplished based on these findings.

Specifically, the present invention provides a resin

composition including a thermoplastic elastomer and a glycol or its derivative.

In addition, the present invention provides a molded article composed of the aforementioned resin composition.

5

Best Mode for Carrying Out the Invention

A resin composition of the present invention comprises a thermoplastic elastomer and a glycol or its derivative.

Such thermoplastic elastomers include a wide variety of polymers that exhibit properties as rubbers at ordinary temperatures but exhibit thermoplasticity at high temperatures, such as polyamide-based elastomers, polyester-based elastomers, polyurethane-based elastomers, styrenic elastomers, polyolefinic elastomers, and poly(vinyl chloride)-based elastomers.

Of these thermoplastic elastomers, polyamide-based elastomers and polyester-based elastomers, for example, are preferred. Illustrative polyamide-based elastomers are polyether amide block copolymers each having a polyamide component as a hard segment and a polyether component as a soft segment. Such polyamide components constituting the hard segment include, for example, polyamide 6, polyamide 66, polyamide 11, and polyamide 12. Polyether components constituting the soft segment include, for example, polyethylene glycol, polypropylene glycol, and

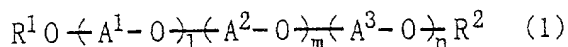
25

polytetramethylene glycol.

Illustrative polyester-based elastomers are, for example, block copolymers each having a polyester component such as polybutylene terephthalate as a hard segment and a long-chain polyol or polyester component as a soft segment.

Preferred thermoplastic elastomers for use in the present invention include elastomers having a soft segment composed of a polyether or polyester. Each of these thermoplastic elastomers can be used alone or in combination.

The glycol or its derivative includes, for example, a compound represented by the following Formula (1):



(wherein each of R^1 and R^2 is, identical to or different from each other, a hydrogen atom, an alkyl group or an acyl group; each of A^1 , A^2 and A^3 is, identical to or different from one another, an alkylene group having 2 or more carbon atoms; each of l , m and n is, identical to or different from one another, an integer of 0 or more, where $l+m+n>0$.)

Alkyl groups in R^1 and R^2 include methyl, ethyl, propyl, isopropyl, butyl, isobutyl, s-butyl, t-butyl, pentyl, hexyl, and other alkyl groups each having from about 1 to about 6 carbon atoms. Among them, alkyl groups each having from about 1 to about 4 carbon atoms are preferred, of which methyl group or ethyl group is typically preferred.

Acyl groups in R^1 and R^2 include, but are not limited to, acetyl, propionyl, butyryl, benzoyl, and other aliphatic, alicyclic or aromatic acyl groups each having from about 2 to about 8 carbon atoms.

5 At least one of R^1 and R^2 is preferably a hydrogen atom, and both of R^1 and R^2 are typically preferably hydrogen atoms.

Alkylene groups each having 2 or more carbon atoms in A^1 , A^2 and A^3 include, but are not limited to, ethylene group, propylene group, trimethylene group, tetramethylene group, pentamethylene group, 2,2-dimethyltrimethylene group, 10 hexamethylene group, and other straight- or branched-chain alkylene groups each having from about 2 to about 6 carbon atoms, of which alkylene groups each having from 2 to 4 carbon atoms are preferred.

15 $(1+m+n)$ is an integer of 1 or more, and is preferably an integer from about 1 to about 30000, more preferably from about 10 to about 5000, and typically preferably from about 20 to about 1000.

Illustrative compounds represented by Formula (1)
20 include, but are not limited to, ethylene glycol, propylene glycol, trimethylene glycol, 1,3-butanediol, tetramethylene glycol, neopentyl glycol, hexanediol, and other alkylene glycols; diethylene glycol, triethylene glycol, polyethylene glycol (hereinafter these may be generically referred to as
25 "polyethylene glycols"), dipropylene glycol, tripropylene

glycol, polypropylene glycol (hereinafter these may be generically referred to as "polypropylene glycols"), polytetramethylene glycol, polyoxyethylene polyoxypropylene block copolymers, polypropylene tetramethylene glycol (PPTG) (polyoxypropylene polyoxytetramethylene block copolymers), and other polyalkylene glycols (including copolymers); and monoalkyl ethers, dialkyl ethers, monoacyl derivatives, diacyl derivatives, and monoalkyl ether monoacyl derivatives of these compounds.

Each of these glycols or derivatives thereof can be used alone or in combination. Preferred glycols or derivatives thereof are polyethylene glycols, polypropylene glycols, polypropylene tetramethylene glycol (PPTG), and other polyalkylene glycols (including copolymers). The number average molecular weight of the polyalkylene glycol is, for example, from about 30 to about 1000000, preferably from about 60 to about 100000, and more preferably from about 120 to about 50000.

The amount of the glycol or its derivative in the invented resin composition can be appropriately selected within a range not deteriorating the properties of the thermoplastic elastomer, and is generally from about 0.1 to about 10 parts by weight, preferably from about 0.1 to about 8 parts by weight, and more preferably from about 0.5 to 6 parts by weight, relative to 100 parts by weight of the thermoplastic elastomer.

If the amount of the glycol or its derivative is excessively large, this component may bleed out from the resin, or even if all of the component is incorporated into the resin, inherent properties of the thermoplastic elastomer such as strengths and heat resistance may be deteriorated. In contrast, if the amount is excessively small, impact resistance at low temperatures may not be significantly improved.

The invented resin composition may further comprise a plasticizer. Such plasticizers include, but are not limited to, triphenyl phosphate, tricresyl phosphate, tris(isopropylphenyl)phosphate, triethyl phosphate, tributyl phosphate, trioctyl phosphate, tris(β -chloroethyl)phosphate, tris(dichloropropyl)phosphate, tris(butoxyethyl)phosphate, tris(β -chloropropyl)phosphate, octyl diphenyl phosphate, and other phosphoric ester plasticizers; polyester plasticizers, epoxy plasticizers, anhydrous hydrophthalic ester plasticizers; butyl benzyl phthalate, dilauryl phthalate, diheptyl phthalate, dibutyl phthalate, diethyl phthalate, dimethyl phthalate, diisodecyl phthalate, dioctyl phthalate, dicyclohexyl phthalate, dioctyl adipate, diisodecyl adipate, di(butoxyethyl) adipate, di(2-ethylhexyl) azelate, dioctyl sebacate, dibutyl sebacate, acetyl triethyl citrate, di(2-ethylhexyl) maleate, dibutyl maleate, dibutyl fumarate,

2-ethylhexyl p-hydroxybenzoate, and other ester plasticizers; stearic plasticizers; trimellitic plasticizers; benzenesulfonic acid butylamide, and other aromatic sulfonamide plasticizers; plasticizers for rubber; and chlorinated paraffin. Each of these plasticizers can be used alone or in combination depending on the type of the thermoplastic elastomer. For example, when a polyamide-based elastomer is used as the thermoplastic elastomer, 2-ethylhexyl p-hydroxybenzoate, and other benzoic ester plasticizers, and benzenesulfonic acid butylamide and other aromatic sulfonamide plasticizers are preferred.

The amount of the plasticizer depends on the type of thermoplastic elastomer used and desired physical properties such as elastic modulus in bending, and is generally from 1 to 30 parts by weight, and preferably from 5 to 20 parts by weight, relative to 100 parts by weight of the thermoplastic elastomer.

The invented resin composition may further comprise conventional additives within ranges not deteriorating impact resistance at low temperatures. Such additives include, but are not limited to, inorganic fillers, graphite, glass fibers, metallic fibers, complex fibers, gypsum fibers, ceramic fibers, coupling agents, heat stabilizers, weather-resistance stabilizers, mold release agents, lubricants, coloring agents, antistatic agents, flame

retardant agents, and foaming agents.

The invented resin composition can be prepared by mixing and melting the thermoplastic elastomer with the glycol or its derivative, and, according to necessity, plasticizers, other resins, and additives. The individual components can be mixed by using conventional mixers, extruders, kneaders, and other kneading machines.

Using the above-prepared resin composition, a molded article having a desired shape can be obtained by a conventional melt molding technique such as compression molding, injection molding or extrusion molding. Illustrative molded articles thus obtained include, for example, shuttlecocks and other sports goods, shoes, tubes, hoses, gears, and other parts for automobiles or machines, and electrical device parts.

Industrial Applicability

The present invention can substantially improve impact resistance at low temperatures without deterioration of the satisfactory physical properties of thermoplastic elastomers, such as tensile properties, flexural properties, and heat resistance properties. This is probably because the glycol or its derivative is incorporated into the soft segment moiety of the thermoplastic elastomer and plays some role to improve impact resistance at low temperatures, whereas details of the

reasons are not completely clarified.

Examples

The present invention will be illustrated in further
5 detail with reference to several examples and a comparative
example below, which are not intended to limit the scope of
the invention.

EXAMPLE 1

A total of 100 parts by weight of a polyamide elastomer
10 (produced by Daicel-Huels Ltd., under the trade name of
"Daiamide PAE"), 0.5 part by weight of an antioxidant
(produced by Ciba Specialty Chemicals Corporation, under the
trade name of "Irganox 245"), and 2 parts by weight of
polypropylene glycol (a reagent produced by Nacalai Tesque,
15 Inc.) were compounded using a biaxial extruder, and the
resulting compound was injected and molded at a temperature
of 280°C using an injection molding machine to thereby yield
test pieces [a tensile dumbbell (according to ASTM D 638),
flexural dumbbell (according to ASTM D 790), and IZOD impact
20 test dumbbell (with notches) (according to ASTM D 256) each
according to ASTM specifications].

EXAMPLE 2

A total of 100 parts by weight of a polyamide elastomer
(produced by Daicel-Huels Ltd., under the trade name of
25 "Daiamide PAE"), 0.5 part by weight of an antioxidant

(produced by Ciba Specialty Chemicals Corporation, under the trade name of "Irganox 245"), and 2 parts by weight of polyethylene propylene glycol (a reagent produced by Nacalai Tesque, Inc.) were compounded using a biaxial extruder, and the resulting compound was injected and molded at a temperature of 280°C using an injection molding machine to thereby yield test pieces [a tensile dumbbell (according to ASTM D 638), flexural dumbbell (according to ASTM D 790), and IZOD impact test dumbbell (with notches) (according to ASTM D 256) each according to ASTM specifications].

COMPARATIVE EXAMPLE 1

Test pieces were prepared in the same manner as in Example 1, except that polypropylene glycol was not added.

Evaluation Test

Tensile properties at 23°C x 50% RH (according to ASTM D 638), flexural properties (according to ASTM D 790), and IZOD impact strength at 23°C, 0°C, -20°C, and -40°C (according to ASTM D 256) of the test pieces obtained in the examples and comparative example were determined. The results are shown in Table 1.

Table 1

	Temperature	Unit	Example 1	Example 2	Comp. Ex. 1
Tensile strength at yield	23°C	MPa	21	21	21
Tensile strength at break	23°C	MPa	37	37	37
Tensile elongation at break	23°C	%	300	300	300
Flexural strength	23°C	MPa	15	15	15
Elastic modulus in bending	23°C	MPa	290	290	290
IZOD impact strength	23°C	J/m	not broken	not broken	not broken
	0°C	J/m	not broken	not broken	not broken
	-20°C	J/m	not broken	not broken	250
	-40°C	J/m	250	190	70

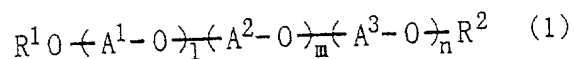
CLAIMS

1. A resin composition comprising a thermoplastic elastomer and a glycol or its derivative.

5 2. A resin composition according to claim 1, wherein said thermoplastic elastomer is a polyamide- or polyester-based thermoplastic elastomer.

10 3. A resin composition according to claim 1, wherein the soft segment of said thermoplastic elastomer is composed of a polyether or polyester.

4. A resin composition according to claim 1, wherein said glycol or its derivative is a compound represented by the following Formula (1):



15 (wherein each of R^1 and R^2 is, identical to or different from each other, a hydrogen atom, an alkyl group, or an acyl group; each of A^1 , A^2 and A^3 is, identical to or different from one another, an alkylene group having 2 or more carbon atoms; each of l , m and n is, identical to or different from one another, an integer of 0 or more, where $l+m+n>0$.)

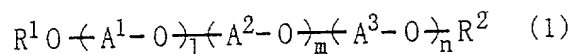
20 5. A resin composition according to claim 1, wherein the amount of the glycol or its derivative is from 0.1 to 10 parts by weight relative to 100 parts by weight of the thermoplastic elastomer.

10469368

6. A molded article composed of a resin composition according to any one of claims 1 to 5.

ABSTRACT

A resin composition of the invention includes a thermoplastic elastomer and a glycol or its derivative. Polyamide- or polyester-based thermoplastic elastomers, for example, can be used as the thermoplastic elastomer. The soft segment of the thermoplastic elastomer may be composed of a polyether or polyester. As the glycol or its derivative, for example, a compound represented by the following Formula (1):



(wherein each of R^1 and R^2 is, identical to or different from each other, a hydrogen atom, an alkyl group or an acyl group; each of A^1 , A^2 and A^3 is, identical to or different from one another, an alkylene group having 2 or more carbon atoms; each of l , m and n is, identical to or different from one another, an integer of 0 or more, where $l+m+n>0$) can be used. This resin composition can substantially improve impact resistance at low temperatures while maintaining tensile properties, flexural properties and heat resistance properties.

BIRCH, STEWART, KOLASCH & BIRCH, LLP

PLEASE NOTE:
YOU MUST
COMPLETE THE
FOLLOWING:

COMBINED DECLARATION AND POWER OF ATTORNEY FOR PATENT AND DESIGN APPLICATIONS

ATTORNEY DOCKET NO.
3273-0142P

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated next to my name; that I verily believe that I am the original, first and sole inventor (if only one inventor is named below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Insert Title:

RESIN COMPOSITION HAVING IMPROVED IMPACT RESISTANCE AT LOW TEMPERATURES

Fill in Appropriate
Information -
For Use Without
Specification
Attached:

the specification of which is attached hereto. If not attached hereto,

the specification was filed on _____ as
United States Application Number _____; and /or

the specification was filed on October 24, 2000 as PCT
International Application Number PCT/JP00/07407; and was
amended under PCT Article 19 on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months (six months for designs) prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as follows.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 (a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Insert Priority
Information:
(if appropriate)

Prior Foreign Application(s)

<u>306458/1999</u> (Number)	<u>JAPAN</u> (Country)	<u>October 28, 1999</u> (Month/Day/Year Filed)
_____ (Number)	_____ (Country)	_____ (Month/Day/Year Filed)
_____ (Number)	_____ (Country)	_____ (Month/Day/Year Filed)
_____ (Number)	_____ (Country)	_____ (Month/Day/Year Filed)
_____ (Number)	_____ (Country)	_____ (Month/Day/Year Filed)

Priority Claimed

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Yes	<input type="checkbox"/> No

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below.

Insert Provisional
Application(s):
(if any)

_____ (Application Number)	_____ (Filing Date)
_____ (Application Number)	_____ (Filing Date)

All Foreign Applications, if any, for any Patent or Inventor's Certificate Filed More Than 12 Months (6 Months for Designs) Prior To The Filing Date of This Application:

Insert Requested
Information:
(if appropriate)

Country	Application No.	Date of Filing (Month/Day/Year)
_____	_____	_____
_____	_____	_____

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

Insert Prior U.S.
Application(s):
(if any)

_____ (Application Number)	_____ (Filing Date)	_____ (Status - patented, pending, abandoned)
_____ (Application Number)	_____ (Filing Date)	_____ (Status - patented, pending, abandoned)

I hereby appoint the following attorneys to prosecute this application and/or an international application based on this application and to transact all business in the Patent and Trademark Office connected therewith and in connection with the resulting patent based on instructions received from the entity who first sent the application papers to the attorneys identified below, unless the inventor(s) or assignee provides said attorneys with a written notice to the contrary:

15 -
Terrell C. Birch (Reg. No. 19,382)
Joseph A. Kolasch (Reg. No. 22,463)
Bernard L. Sweeney (Reg. No. 24,448)
Charles Gorenstein (Reg. No. 29,271)
Leonard R. Svensson (Reg. No. 30,330)
Andrew D. Meikle (Reg. No. 32,868)
Joe McKinney Muncy (Reg. No. 32,334)
C. Joseph Faraci (Reg. No. 32,350)

Raymond C. Stewart (Reg. No. 21,066)
James M. Slattery (Reg. No. 28,380)
Michael K. Mutter (Reg. No. 29,680)
Gerald M. Murphy, Jr. (Reg. No. 28,977)
Terry L. Clark (Reg. No. 32,644)
Marc S. Weiner (Reg. No. 32,181)
Donald J. Daley (Reg. No. 34,313)

Send Correspondence to:

BIRCH, STEWART, KOLASCH & BIRCH, LLP

P.O. Box 747 • Falls Church, Virginia 22040-0747

Telephone: (703) 205-8000 • Facsimile: (703) 205-8050

PLEASE NOTE:
YOU MUST
COMPLETE THE
FOLLOWING:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of First or Sole
Inventor:
Insert Name of Inventor
Insert Date This
Document is Signed

Insert Residence
Insert Citizenship

Insert Post Office
Address

Full Name of Second
Inventor, if any:

see above

Full Name of Third
Inventor, if any

see above

Full Name of Fourth
Inventor, if any

see above

Full Name of Fifth
Inventor, if any

see above

GIVEN NAME <u>Hiroaki</u>	FAMILY NAME <u>ARITA</u>	INVENTOR'S SIGNATURE <u>Hiroaki Arita</u>	DATE* <u>June 13, 2001</u>
Residence (City, State & Country) <u>Himeji-shi, HYOGO, JAPAN JPX</u>		CITIZENSHIP <u>JAPAN</u>	
POST OFFICE ADDRESS (Complete Street Address including City, State & Country) <u>1365-2-603, Shinzaike, Aboshi-ku, Himeji-shi, HYOGO 671-1234 JAPAN</u>			
GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
Residence (City, State & Country)		CITIZENSHIP	
POST OFFICE ADDRESS (Complete Street Address including City, State & Country)			
GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
Residence (City, State & Country)		CITIZENSHIP	
POST OFFICE ADDRESS (Complete Street Address including City, State & Country)			
GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
Residence (City, State & Country)		CITIZENSHIP	
POST OFFICE ADDRESS (Complete Street Address including City, State & Country)			
GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE*
Residence (City, State & Country)		CITIZENSHIP	
POST OFFICE ADDRESS (Complete Street Address including City, State & Country)			

* DATE OF SIGNATURE